

THE AMERICAN JOURNAL OF  
OPHTHALMOLOGY.

VOL. V.

NOVEMBER, 1888.

No. 11.

AN ALLEGED DEFECT OF THE PRISOPTOMETER.

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It has been stated to me, that, in correcting amétropia with the prisoptometer, the correcting glass should be placed *next to the eye*

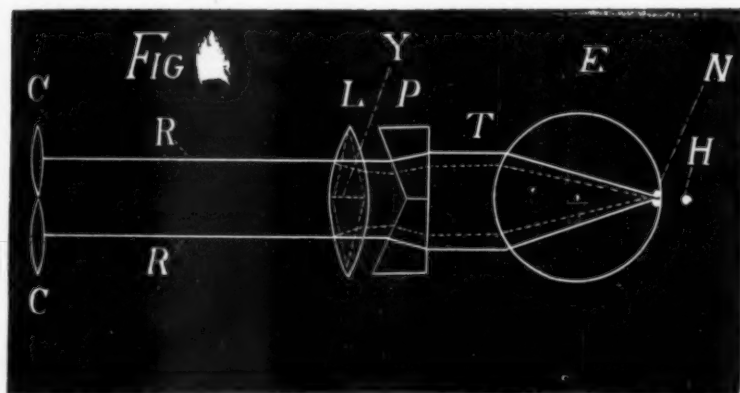


FIG. 12.

of the observer, and not upon the *distal* side of the prisms and

eye-plate, as now arranged in this instrument. This subject may be illustrated by the following figure, in which T is assumed to be the proper point to apply the correcting lens by the objector, instead of L, the location of the correcting glass as now arranged in said instrument. At C C' is represented, the circle C and its false image C', which are placed and seen at a fixed distance given with each instrument, from four to six metres, from P, the double-prisms, the apices of which latter are placed in contact. The heavy rays of light RR' from CC' are parallel, and supposing the + lens L removed, then these rays reaching the prisms at P, will be refracted outward, toward the base of the prisms, and after leaving the prisms P, will again become parallel and thus, incident upon the cornea will be brought to a focus upon the retina in the emmetropic eye E as seen at N. When this occurs the inner margins of CC' and the little circles as shown at N will be tangent. The distance from P' to CC' is so arranged or adjusted that this contact shall result in the normal eye at CC' and N. It is evident that to obtain this contact the rays of light must be parallel and reach the cornea of the eye E parallel, else tangency will not obtain. It is maintained that the eye, in relation to this instrument should be so placed, that the distance, from L to the cornea E, should be thirteen millimètres, or about half an inch. When the eye is closely applied to the prisms, its cornea is about that distance, (that of L to E) in the instrument as now manufactured: But still it is held by one party that L, the correcting glass, should be placed at T. To do this the proximity of the patient's face would be so close to the prisms as to inconvenience the oculist and patient by the frequent removal of the face of the latter, and as the breath of the latter would cloud the trial lenses by breath-moisture, and hence the object-circles would be obscured.

The problem then is, does the position of L, when the correcting glass is close to the prisms, as shown in Fig. 12, impair the obtaining of the true correcting glass sought. It must be restated, that when the correcting glass L is *not in situ*, in the instrument, the prisms P cause rays of light incident upon the cornea to be parallel.

The practical test of our subject is as follows, and can be demonstrated by all who have the prisoptometer, that it is immaterial how close or far from E, the eye is from the prisms P to the right of the prisms, and that it is immaterial whether the correcting glass be placed at T or L.

For example let an ametrope with  $=D\ 1.5$  of hyperopia be the subject. The object-circles, CC' are seen apart, and on placing  $+D\ 1.5$  sph. at L, they become tangent, the eye E being close to P. the prisms. If now this  $+$  lens be transposed to T the object-circles will still be tangent. In the position of L or T, the images of the object-circles still touch in the now corrected eye, and in either location of the correcting glass at L or T, if the eye be withdrawn to the right from the prisms, the circles will still be seen in contact. Even if we remove the eye to the right six inches the images are still seen to touch. And again if we place the eye at six inches to the right of the prisms and apply the  $+D\ 1.5$  spheric at thirteen millimètres from the cornea, the object-circles will still touch.

These practical experiments denote that the correcting glass has, so far, been obtained, but mainly, illustrating our views, that it is immaterial whether the correcting glass be placed at L or T, or if the eye be close or more removed to the right from the prisms.

It is however important that the eye be close to the prisms as a clearer view will be obtained of the object-circles, through the aperture of the instrument on the T side of the prisms, and the head will be more immovable placed against the instrument.

Why is the position of the correcting glass in the sense we are now considering, immaterial, whether it is placed at L or T? In a word the answer is that the rays of light reach the cornea parallel even when the correcting glass has been applied, and the rays so approximated to the axial line of the eye; that whereas they were apart and not in focus at N, but tending to a focus at H, Fig. 12, now when the correcting glass is applied, these rays are caused by this glass to approximate so much nearer to the axial line of the eye as to enable *this hyper-*

*opic eye* by its refractive power, defective as this is, to bring to a focus such induced parallel rays. This is illustrated by the dotted lines in Fig. 12, in which it will be seen that these punctated lines reach the cornea parallel, and that these lines are so much nearer and are parallel to the axial line of the eye, that even *its* defective refraction is now sufficient to enable the eye to induce a focus upon the retina, because said lines are less distance apart from each other.

It will be seen at a glance, that it is immaterial whether this correcting glass be placed at L or T, for if at T the prisms will first cause divergence, and then subsequently the + glass will induce approximation of the rays. If the + glass is placed at L the order of refraction will be reversed, but the result will be the same, *i. e.*, parallel lines incident upon the cornea.

So far as the refraction of the prisms is concerned, the rays are always parallel when the correcting glass is *not* in position, and by the correcting glass, the normal parallel rays of the instrument are brought nearer to the axis of the eye, the dark lines becoming the dotted lines, (as see Fig. 11,) and enabling the power of this hyperopic eye, to focus the rays of light upon the retina at N. It is immaterial what the power of the correcting glass may be, this parallelism of the rays of light will be induced when the inner edges of the object-circles CC' shall have become tangent.

It is also probable that this correcting lens, L, acts as a double-prism, with base to base, as see Y, Fig. 12, and denoted by the dotted lens within the area of L.

The fact would seem to be, that with the prisoptometer, we are by the application of correcting glasses, simply acting upon the prisms P, and causing a variation in the position of the normally parallel lines of the instrument. As the degree of hyperopia increases, so more and more will the parallel (dotted) rays be brought closer to the axis of the eye by the proper correcting glass, acting, probably, as prisms, with their bases applied as seen in Fig 12. If these views are correct it is immaterial where the correcting glass is applied, at L or T.

But it should be stated that it is of *great* importance that the correcting glass be placed *close* to the prisms at L, for if removed beyond 13 millimètres to the left of the prisms P there will be error induced both in + and — from glasses, their separation to the left from the prisms. In fact these prisms, as arranged in the prisoptometer seem to act as does the eye, when correcting glasses are applied to it, increasing the power of convex glasses and diminishing the size of the image by concave glasses by the removal to the left of the lenses from the eye or prisms.

If the defect is myopia, see Fig. 13, concave glasses acting

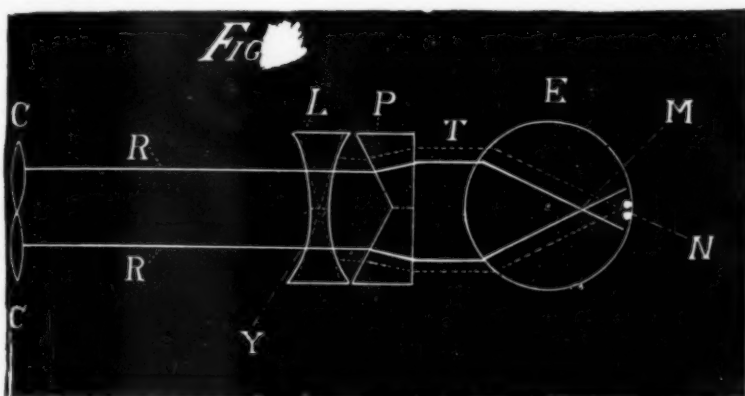


FIG. 13.

as prisms, their apices applied to each other as seen at Y, Fig. 13, will cause the dark parallel lines RR' to be removed further from the axial line of the eye, and to take the direction of the dotted parallel lines incident upon the cornea, and hence the focus, M, of the ametropic eye E, will be cast posteriorly upon the retina as represented at N, Fig. 13.

As the principle is the same as expressed above as to hyperopia, only the negative trial glass acts the reverse of the positive lens, spreading in lieu of approximating the rays, the same conclusion may be drawn as to the position of the glass at L or T as has already been explained above in

hyperopia, and hence it is not necessary to restate what has already been written above. A reference to Fig. 13 will explain all that need be said as to the location of the correcting glasses in myopia with the prisoptometer.

If our theory is a fact, then it may properly be concluded from the foregoing considerations that, the trial glasses should be placed at L, (and not at T,) close to the prisms, P, as now placed in the prisopmeter, in correcting all forms of ametropia with this instrument.

A CASE OF PULSATING EXOPHTHALMOS  
PROBABLY DUE TO RUPTURE OF THE  
CAROTID ARTERY IN THE CAVERN-  
OUS SINUS.

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BY F. BULLER, M. D.,

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Montreal General Hospital.

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Pulsating exophthalmos occurring spontaneously or as a result of traumatism is met with so seldom that every new case of this kind may still claim a place in the records of Ophthalmic Surgery; at the same time the pathology of this affection is now so well understood, in the light of cases already recorded that little or nothing new in this direction remains for present or future observation. In the matter of treatment, however, there is no rule so firmly established but that much must be left to the judgment and discretion of the surgeon. Injury to the carotid artery in the cavernous sinus is no doubt much more common than the records of surgery seem to show. The case I am about to describe is the fourth I have myself seen, two of which have certainly not found their way into ophthalmic literature. The first occurred in a man 45 years of age who was thrown from his horse, striking his head violently on the frozen ground; a few weeks later pulsating exophthalmos gradually made its appearance and steadily augmented for several months. At this time there was enormous proptosis and a large soft pulsating swelling over the inner end of the right eyebrow. Here too a harsh bruit could be heard with the stethoscope and the patient was much troubled with a pulsating noise in the head. Ligature of the carotid was finally performed, but I believe the patient died a few weeks



later from repeated and severe attacks of epistaxis. The second case has been placed on record by Walter Rivington. [*Med. Chirurg. Transact.*, Vol. LVIII, p. 183.]

The third case was in a young man who in a boiler explosion was struck over the left brow by a large fragment of iron, receiving a depressed fracture of the frontal bone. About four weeks later he came to me on account of defective vision of the left eye. I found the vision of this eye very much impaired and a pronounced atrophy of the optic nerve. He was under observation about ten days during which time he had two slight attacks of epistaxis. A day or two later just as he was leaving home to visit the hospital he was suddenly seized with a violent epistaxis and bled to death in a few minutes. The post mortem showed a depressed fracture of the frontal bone, a fissure extending from this across the orbital roof, the optic foramen, and the body of the sphenoid directly beneath the cavernous sinus. Here an ulceration of the bone had taken place and a direct communication was established between the vault of the left nostril and the left internal carotid, which had either been perforated by a spicule of bone at the time of the injury or had subsequently become involved in the ulcerative process affecting the bone beneath it.

In this case the aperture in the artery did not communicate with the cavernous sinus, hence there was no arterio-venous aneurism.

The fourth case being the subject proper of this communication came under my observation on the 24th of last May.

About the middle of last February, W. G., aged 28, a robust and perfectly healthy young man fell from a railway bridge a distance of twenty feet striking the right side of head and face on a piece of square timber. Was said to have been unconscious for about twenty-four hours. Both upper and lower jaw on the right side were supposed to have been fractured, but there are no signs of this lesion now discoverable.

The right side of the head and face were greatly swollen for several days, the right eye being closed for five days after the injury.



During this time he suffered a good deal of pain in the injured parts. When the swelling subsided so that he could see again with both eyes, there was diplopia, one object appearing higher than the other, and less distinct. As soon as he recovered consciousness, he also became aware of a loud beating sound in the right ear which has continued unabated ever since.

After a few days there was no more pain, but the eye remained moderately swollen, and the diplopia was constantly present, the higher, false image, moving perceptibly up and down with each heart-beat.

During the succeeding eight or ten weeks there was no perceptible change in his condition, and he was able to follow his employment. About two weeks ago he again became troubled with pain, which was chiefly referred to the orbit and brow. With this there was a marked increase in the prominence of the eye and the swelling of the eyelids. Four days ago the pain became intense, so that he was unable to sleep at night. It was indeed the pain that finally induced him to give up his work and seek relief.

When I first saw him the appearance of the eye was strongly suggestive of orbital cellulitis. The lids had a tense dusky and swollen aspect, the eyeball was strongly protruded and stationary, whilst the swollen and œdematous ocular conjunctiva extending far in advance of the palpebral fissure was covered with a watery and mucous secretion. The conjunctiva generally was in a state of well marked venous hyperæmia. The refractive media were unimpaired, and, when the upper lid was slightly raised, there was no difficulty in making a satisfactory ophthalmoscopic examination; this showed a somewhat œdematous condition of the retina, this structure being somewhat cloudy, with enlargement and tortuosity of its venous system. The optic nerve was not swollen, though its margins were slightly indistinct. In other respects the fundus oculi was perfectly normal. Vision was reduced to  $\frac{20}{c}$ , the pupil, slightly dilated and fairly active, the visual field unim-

paired. Displacement of the eye amounted to about  $\frac{5}{10}$  inches in an outward, and  $\frac{6}{10}$  inches in a forward direction.

At the inner extremity of the eyebrow there was an ill-defined swelling, soft and elastic to the touch, and imparting a distinct thrill to the examining finger; just at this point, too, the stethoscope disclosed a harsh, rasping bruit, synchronous with the action of the heart. This sound was distinctly audible for a considerable distance upwards, and also outwards as far as the zygoma. Pressure over the common carotid greatly diminished its intensity.

The eyeball could be pressed nearly into its proper place, but when this was done, it communicated to the fingers a strong pulsation. A pulsating movement of the eye was also readily seen in profile view.

Pressure over the carotid artery caused almost complete cessation of the pulsation, with softening and reduction of the swelling in the orbit.

Under these circumstances there could be no reasonable doubt we had to do with an arterio-venous aneurism.

Dr. Shepherd and several other members of the hospital staff kindly examined the case with me and it was decided to ligate the common carotid artery without unnecessary delay, the reasons for this decision being as follows:

Pressure over the artery caused reduction of the protrusion of the eye, softening of the orbital swelling and almost complete abolition of the pulsation without distress or inconvenience to the patient, who was moreover a healthy, vigorous man, and likely to bear the operation well. The recent increase in the swelling attended as it was with severe pain and rapid deterioration of vision threatened irreparable damage to the sight unless some speedy means of relief could be obtained. The man himself was exceedingly averse to any form of treatment that did not promise an immediate cure.

On the following day, May 25th, Dr. Shepherd ligated the common carotid in the upper part of its course with the usual antiseptic precautions. Two ligatures were placed around the artery and the vessel severed between them. The edges of

the wound were brought together over a decalcified bone drainage-tube and an antiseptic dressing applied. The immediate effect of the operation on the orbital tumor was the same as had been temporarily obtained by digital compression, softening of the swelling, partial reposition of the eye, great diminution in the pulsation and total cessation of the bruit.

Recovery from the anæsthetic was perfectly normal, without the slightest sign of impairment in the cerebral or nervous functions.

May 26th. Proptosis greatly diminished, the conjunctival oedema has nearly disappeared. Vision greatly improved, and the voluntary movements of the eyeball are tolerably free. There is no diplopia. Patient feels perfectly comfortable.

May 27th. Uninterrupted improvement.

May 28th. Feels quite well and "can see nicely" with the affected eye  $V=^{20}/_{XL}$ . States that since the operation there has been no noise in the ear. Proptosis now only slight in degree.

June 4th. Dressings removed from the neck to-day, the wound found to be completely healed and the bone drainage tube entirely absorbed. Can see as well as ever.  $V=^{20}/_{XX}$ . Movements of the eye appear to be entirely normal, the globe however, is still somewhat displaced forwards.

June 12th. Patient thinks himself cured and declines to remain longer in hospital. Beyond a slight fulness of the orbit there is no indication of the recent orbital affection.

A CASE OF DOUBLE VASCULAR EXOPHTHALMOS.—  
RECOVERY UNDER INTERMITTENT COMPRES-  
SION OF THE RIGHT CAROTID ARTERY  
AND THE INTERNAL USE OF THE IO-  
DIDE OF POTASSIUM. COCAINE  
CONJUNCTIVITIS<sup>1</sup>.

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BY CHARLES J. KIPP, M.D., NEWARK, N. J.

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Mrs. M., a stout but feeble lady 76 years of age, consulted me for the first time on August 4, 1886, for protrusion of the eyeball, impairment of sight, and a very loud noise in her right ear and the right half of the head. I learned from her that she had always been in good health, and that her sight, up to a year ago was good. About three months before her visit to me she fell down several steps and struck her head against the ground. She was stunned by the fall, but did not become unconscious. No hæmorrhage from nose, mouth, or ear, followed the fall. As to the exact date of the beginning of the noise she is in doubt, but thinks that it was present some days before the fall, since then it has, however, been much louder. The members of her household attribute it to her fall. Up to two weeks ago she heard the noise in both ears, now she hears it only in the right half of the head. The noise prevents her from sleeping, and has made her very nervous. The protrusion of this eye was first noticed after this fall.

On examination I found both eyes much protruded forward and slightly downward; the right, perhaps a little more than the left. I estimated the protrusion of the right eye at 5 mm., that of

<sup>1</sup>Read before the American Ophthalmological Society at New London, Conn., July 18, 1888.

the left at 4 mm. The upper lids were enlarged but not red. The mobility of both eyeballs were considerably impaired in all directions. The impairment was greatest in the right eye, and most marked outward. The external rectus muscle of this eye was paralyzed. At the upper and inner angle of the orbit there was a marked fulness, but no tumor could be felt. There was no visible pulsation of the eyeballs, and none was felt on pressing the eyeballs back into the sockets with the hand. On placing my ear against her right temple I heard a loud blowing noise with every pulsation of the carotid, and a fainter continuous sound could also be heard at times. Farther examination revealed that the bruit could be heard all over the anterior half of the head. I could also hear it below the right ear. On compressing the right carotid artery the bruit ceased entirely at once, but the protrusion of the eyes remained unchanged. Compression of the left carotid artery considerably lessened the bruit, but did not stop it. There was a very marked pulsation over the junction of the sternum with the right clavicle, no tumor could be felt, however. The heart seemed healthy.

The condition of the eyes was as follows: The ocular conjunctiva was quite œdematous, and its veins very broad and tortuous. The cornea was clear. The anterior chamber of normal dimensions. Iris normal; pupil active. Lens contains numerous opaque stripes in both anterior and posterior cortical layers. The vitreous body contained many large floating opacities. The optic disk was of a greyish color and flat. It was surrounded by a very broad white ring (atrophy of choroid). Retinal vessels of about normal size. Retina transparent everywhere. No other choroidal changes. Both eyes were in about the same condition. Right eye: Hm. 1.5 D. S=<sup>5</sup>/<sub>xviii</sub>. Left eye: Hm. 1 D. S=<sup>5</sup>/<sub>xxiv</sub>.

As digital compression of the carotid artery produced no unpleasant head symptoms, I taught the patient and a member of her family how to control the right carotid, and directed pressure to be made at short intervals for as long a period as she could bear it. At the same time I prescribed iodide of

potassium in five grain doses three times daily. For the hyperæmia of the conjunctiva I gave her a collyrium composed of boric acid and cocaine.

For a few weeks the compression of the right carotid was kept up by the patient for several hours daily, but after that time she applied it only when the noise in her head was unusually annoying, as the pressure gave her considerable pain. The iodide of potassium was increased to 30 grains daily.

Nine weeks after her first visit to me the exophthalmos was as great and the bruit as marked as then. The lids covered the eyes with difficulty. No pulsation of the eyeballs or of the swelling at the upper inner angle of the orbits has been felt at any time. The right eye was about in the condition first noted, except that the opacity of her lens was greater. The left eye had, however, undergone a remarkable change. The conjunctiva was as before mentioned; the cornea was clear, *the anterior chamber was very shallow, the iris being almost in contact with the cornea.* The deeper part of the eye had not changed. T+ 1 (?) Very careful and frequently repeated examination of the cornea failed to discover anything abnormal in this membrane. The collyrium of boric acid and cocaine had been used quite frequently of late. The irregular compression of the carotid was continued, and the iodide of potassium was given as before mentioned.

Nine days later the anterior chamber of the left eye was again of normal depth. T n. The ocular conjunctiva of this eye was much less swollen, and the greatly enlarged tortuous veins which traversed this membrane some weeks before had largely disappeared. The right eye showed no marked change, though its anterior chamber seemed more shallow than that of the left eye. The protrusion of the eyeballs and the bruit continued as last mentioned.

November 15, (three months and eleven days after first visit) the patient joyfully informed me that the dreadful noise in her head and right ear had ceased two days previously, and auscultation failed to discover it in any part of the head and side of neck. Not a trace of the noise could be heard on the most



searching examination. The left eye has now returned to its normal position, its mobility is unimpaired. The upper lid is still larger than it should be. The oedema and congestion of the ocular conjunctiva have almost entirely disappeared; otherwise the eye is as before. The right eye is as much protruded as formerly, indeed it seems even more bulged than it was since I last saw the patient. \* The upper lid is enlarged and red. The ocular conjunctiva is very oedematous and intensely congested. A wreath of enlarged veins around the cornea is especially conspicuous. The anterior chamber is very shallow. No change in other parts. T n. The globe does not pulsate, and no pulsation can be felt when the eye is pressed into orbit, nor in the swelling at the upper inner angle of the orbit. The compression of the carotid was discontinued, but the iodide of potassium is to be continued.

December 29. There has been no return of the bruit. The left eye is in normal position. Lids normal size. The eye is no longer injected. All enlarged vessels in the conjunctiva have disappeared. The right eye has now almost returned to its normal position. It is still a little more prominent than the left eye, but not enough to be noted by casual observers.

The swelling which formerly occupied the upper inner angle of the orbits has entirely disappeared on both sides. In its place is now occasionally felt a varicose vessel on the right side. The upper lid is no longer red, and is of nearly normal dimensions. The ocular conjunctiva is no longer swollen, and the enlarged vessels have disappeared, except a large one which proceeds from the outer canthus nearly to the margin of the cornea and then dividing into two branches nearly encircles the cornea. The anterior chamber is of normal depth. The lens is much more opaque than formerly.

June 6, 1888. There has been no return of the bruit. The right eye is still slightly more prominent than the left, which is in normal position. The mobility of both eyes is unimpaired in every direction. In the right eye, the enlarged conjunctival vessel above mentioned is still present, otherwise the



ocular conjunctiva is normal. This eye is now blind from cataract. Perception and projection good. The left eye is normal in appearance. The lens is also cataractous. The patient comes to-day to get relief for itching and burning of lids. The lids are a little puffy. The ocular conjunctiva is slightly œdematous, and of a dirty yellowish cast, and the limbus conjunctivæ is enlarged. On everting the lids, the palpebral conjunctiva is found succulent and swollen, and on its surface is studded with innumerable semi-transparent follicles. The condition is almost the same as that seen occasionally after the long continued use of atropia, except that the color of the conjunctiva is a yellowish red. The follicles are found on every part of the palpebral conjunctiva, but are most abundant and of largest size on the retrotarsal folds.

Having seen the same condition follow the long continued use of cocaine, I inquired as to what had been applied to the eyes and learned that a solution of cocaine, which I gave her many months before, had been instilled in both eyes several times daily ever since. No other remedy had been used. I prescribed a collyrium of zinc and stopped the use of the cocaine. Yesterday the follicles were greatly diminished in number, and the swelling of the conjunctiva had almost disappeared.

REMARKS.—In this case the symptoms were probably due to a spontaneous rupture of the right carotid artery in the cavernous sinus. This supposition offers to me at least the most satisfactory explanation of the bilateral exophthalmos and the aneurismal bruit. The absence of pulsation of the eyeballs and of the swellings between the globes and the upper inner orbital wall, and the nearly normal size of the retinal veins were features also in several of the cases collected by Sattler in his exhaustive treatise on pulsating exophthalmos (Graefe & Saemisch Handbuch der gesammten Augenheilkunde, Band V.). That the intermittent compression of the carotid artery and the taking of small doses of the iodide of potassium contributed to the recovery I have, of course, no means of proving, but who can prove that these measures were of no ser-

vice? In view of the very small number of recoveries from this disease without ligation of the carotid artery (see Sattler, op. cit., page 922), I think I need not apologize for occupying your time with the recital of a single case.

Note.—Since the above was read I have successfully extracted the cataract of the right eye. The operation was done under cocaine on Oct. 5, 1888. As the tension of the eye was slightly increased an iridectomy was made. Only slight bleeding followed this step. The cocaine did not cause a relapse of the conjunctivitis and the healing was unattended by pain or injection or swelling of the ocular conjunctiva. The patient returned to her home on Oct. 19. The sight of the eye at that time was  $\frac{5}{XXIV}$ . Since then it has improved to  $\frac{5}{XVIII}$ .

## GENERAL NEUROSES HAVING AN OPHTHALMIC ORIGIN.

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Read in the Section of Ophthalmology at the Annual Meeting of the British Medical Association held in Glasgow, August, 1888.

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It is now some years since I first observed symptoms, many and varied, occurring in neurotic persons who were also the subjects of uncorrected optically defective sight. In investigating more particularly the relationship between the various optic errors and sick headache, or simple headache, I was occasionally startled by the apparent direct relationship between the long uncorrected disorder (with all its immediate train of nervous disorders) and general conditions of ill health which seemed to be the direct out-come of a thus already demoralized nervous system. It is now well established that many cases of migraine or sick headache are directly attributable to the reflected irritation of the brain (and thence the gastric functions and heart's action) from some uncorrected optical state, chiefly on the side of hypermetropia, and always in a neurotic subject. It is also well proven that many of these cases are entirely relieved from their periodic attacks by the use of properly selected glasses; or, having passed an age when the activity of the accommodation ceases more or less, and the eye becomes presbyopic, the severity of the headache or migraine becomes greatly modified. It is further well known that a patient, the subject of hypermetropia, is liable, according to varying circumstances, such as extent of defect and use of eyes, to more or less constant "head pains", not necessarily

associated with very obviously defective vision, or aching eyes but always peculiar in their position and character, and aggravated by close application of the sight. Although I have very fully published my observations some time ago on the relations between sick headache and optical defects, and utilized what was previously discovered as to the relation between headache (broadly defined as such) and hypermetropia, I had not felt my footing sufficiently to enable me to bring forward that which is now my desire to show, namely, that the neuroses growing and arising from congenital optical error are more subtle in their nature, more varied in their distribution, and more demoralizing to the right evolution of the nervous system than I was first led to suppose.

I particularly wish it to be clearly understood I do not think all sick headaches come from an optic defect, for it is well known that decayed teeth, or central irritation of the ear or nose are frequently causes as well as other more general neuroses. But I have patients who have been martyrs to sick headache; who are also astigmatic; and in whom a complete cure has been effected by the use of the cylindrical lenses, showing that when sick headache and its accompanying dyspepsia is due to reflected irritation in a neurotic subject, from the eyes to the stomach, complete immunity from attacks of this kind may be obtained by glasses; and further, as I have observed, a very marked improvement in general cheerfulness and health. I may here remark that many persons who suffer from sick headache are astigmatic in an abnormal though slight degree and it is only by straining their eyes by looking long and hard at some fine object, or exercising such feats of sight-seeing as "doing" the National Gallery and the Academy in one day, or severe microscopical study, reading and the like, which will irritate the brain sufficiently to cause an attack. One patient says he always suffers from sick headache after watching a play; another actually brings on headache, vertigo, and vomiting by doing fine sewing; a third has sick headache only when reading for an examination; a fourth when she was at school, not since; but all proving to be ametropic, and com-

pletely cured by the systematic use of glasses constantly worn.

The most common forms of headache associated with that optical error known as hypermetropia are—either simply a heaviness or pain over the brows (this may or may not be combined with general headache,) or very frequently a tender place on the top of the head, making it particularly painful to dress the hair—such a pain as occurs after a lock of hair has been “slept on the wrong way,” in common parlance; there is also frequently pain at the back of the head. All these pains may be present together, or they may exist singly, but they all occasionally occur in conjunction with severe neuralgia at the back of the neck. This I have frequently noticed, and where it occurred, whether associated with the other head pains or not, it, as well as they, soon disappeared with the systematic use of accurately adapted correcting glasses. The symptom of pain at the back of the head and neck is not one which has long been associated with optical defect, but I have now seen a sufficient number of cases to show without doubt that such may be safely regarded as one of the symptoms of (frequently latent) optical error, perfectly remediable by the use of glasses, and, when such, by glasses only.

Dr. Lauder Brunton wrote me that he has seen several cases of neuralgia of the back of the neck cured by glasses. It would not appear to need demonstration that with symptoms so severe and depressing to the general nervous system as are the various forms of headache—vertigo, which is associated with astigmatism: vomiting; possibly, as I have noted, palpitation, or neurotic dyspepsia between the attacks of migraine—other conditions should arise as a sequel in many constitutions. One which I particularly wish to draw attention to is insomnia. This particular symptom I observed in many cases the subjects of astigmatism. In one instance in particular, where the eyes had given much trouble during the examination period of an Oxford man's life, it was particularly remarked to me that after the astigmatic trouble was corrected by suitable glasses, with an equal amount of work, the insomnia, disappeared, and the whole physical and nervous state of the gentleman improved

greatly. One object of my paper will be to show what an important factor these optical errors are in, as it were, moulding during childhood and early life the nervous and constitutional state of the individual. As a proof of this I will quote two cases, both in ladies of education and refinement, which seem to give us some sort of clue to the possible effects on the constitution of persons who conscientiously struggle through a severe scholastic career with important optical errors entirely uncorrected.

The first case was that of a lady, aged 22, whom, some few years ago, I found to be the subject of compound hypermetropic astigmatism. Her health was not good, but she particularly complained of headache and general feelings of *malaise*. I corrected the astigmatism after very patient testing, since here great nervousness made it a very trying process for myself as well as the patient. There were other symptoms, such as would be ordinarily covered by the convenient but too easily accessible term hysteria, which showed itself in subjective pains at the back of the neck, tenderness of the spine, and frequently of the skin generally. There was no apparent lesion in any important organ, and she appeared to be the possessor of a greatly demoralised nervous system, which was easily overwrought, no matter what amount of moral pluck appeared to be put forth to resist an attack. After wearing the glasses for three years constantly her whole being seemed to change, so great was the relief. All headaches and difficulty in obtaining sleep disappeared, the appetite improved, and she became more companionable at home; but there was evidently, with all this improvement, a disordered state of the nervous system not yet removed; the tenderness of the spine remained more or less, and the health was still subject to variable and unaccountable fluctuations. I made up my mind that though the head pains had been so far cured by the use of glasses, yet the long struggle in pain and toil of educational work had so far damaged the peripheral nerves that some other means of cure must be attempted.

I could multiply instances in which varying degrees of this

kind of nervous demoralisation occurred ; but generally there is either nerve-resisting power or neurotic recuperation sufficient to enable the individual to recover if the sight be fully corrected. I am perfectly convinced that until the sight had been corrected all such treatment as I have indicated would be useless. If carefully looked into, this appears to me to suggest some very important conclusions in relation to the community at large. I see children driven to their work although suffering from defective sight, constant headache, and restless nights, which result in great exhaustion of the nervous system, disturbance of the various functions of the body, and a disinclination to innocent and beneficial child-play, all of which is with perfect ease set to right by a correction of the optical defect which causes it. But supposing that a naturally nervous subject grows up under these conditions, the right evolution of the nervous system is undoubtedly endowed with morbid action, as well as the formation of the character disturbed. The causes are evident ; the consequences, I believe, will be found in some of the neuroses which I have endeavored thus imperfectly to describe.

There are conditions and pains associated with these *head pains*, and commonly attributed by the patient to disease of the eyes, since the eyes are frequently affected. I refer to the pain in and around, due to carious teeth, and these pains are frequently coincident with other—if I may so call them—ophthalmic neuroses. The existence of apparently quiescent carious lower molars causes invariably a point of pain in the temporal region ; but the upper molars, when carious—one or all it may be—cause pain above the outer part of the eyebrow of the same side. Decay of the incisors and canines or bicuspid, mostly quiescent in the mouth, commonly causes pain either in the eye or about the inner side of the orbit above the diseased teeth. The extraction of the offending teeth invariably removes the local pain. These conditions were so frequently referred to diseases of the eye, that it became necessary to localize pains in the head so as to correctly diagnose their origin, and hence reach the cause.—(*British Medical Journal.*)



## TRANSLATION.

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The following is part of a paper which was intended to be read by Prof. Zehender before the International Congress of Ophthalmologists at Heidelberg, and is published in *Klinische Monatsblätter fuer Augenheilkunde*, October, 1888.

I have mentioned before that I have a slight degree of astigmatism; I have not always had it, it has grown on me. When Donders published his papers on astigmatism and cylindrical lenses, and when Helmholtz said in his *Physiological Optics* (page 140): "The eye is not generally accommodated at one and the same time for vertical and horizontal lines lying at an equal distance from it," it was difficult for me, not to say impossible, to see the truth of it on myself. Indeed, sometimes I thought I saw a difference between the vertical and the horizontal lines, yet the next moment I found it was no longer the case. Of late I have made experiments with the eyes of younger colleagues whose faculty of accommodation was as yet in full power, and these have convinced me that by means of the accommodation the eye cannot only be adjusted for near and far objects, but that even astigmatic conditions of the refractive media may thereby be corrected, and that optic anomalies artificially produced may thus be overcome.

There seems to be no doubt that with a little exercise young persons with good accommodation are able to overcome weak cylindrical glasses, in a similar way as we can learn to overcome the action of prismatic lenses.

The question of the dynamic or accommodative astigmatism of the crystalline lens was again brought before the Congress at Heidelberg by Javal, but could not, on account of lack of

time, be fully discussed. It grants to the crystalline lens the faculty of neutralizing anomalies in the curvature of the cornea, of correcting the corneal astigmatism by astigmatism of the crystalline lens (under other circumstances of aggravating it).

This faculty conceded, we must further concede, that astigmatism of the lens, as well as myopia of the lens, may be acquired; that just as at first spasm of the accommodation, but finally real myopia will follow the wearing of strong concave glasses—if the experiment was made in early youth—it may be possible to produce real astigmatism by the wearing of cylindrical lenses. This is not the place to discuss the mechanism of this faculty. Yet, the discussions at the last Congress have shown sufficiently plain, that the explanation of the mechanism of accommodation is still a hypothetic one, and not much better founded than it was at the time when the function of accommodation was first discovered. We know for certain, that the shape of the lens changes, but we know very little of how this change is brought about, and we know still less, whether this change of shape is exclusively due to a change in the length of its radii of curvature, or whether, unconsciously, but voluntarily, its spherical shape can, perhaps, be changed into an ellipsoid or ovoid form. If we grant the latter to be possible, we concede at the same time the possibility of the formation of astigmatism of the crystalline lens during the course of life. Such a lenticular astigmatism would also be produced, if we could accept the theory, improbable as it is, that the muscle of accommodation possesses the power, not only to change the curvature of the crystalline lens, but also to give it an oblique position. Such a theory would be decidedly without foundation!

Let us, however, concede that astigmatism of the crystalline lens may be acquired during life, as has been undoubtedly the case in my eyes, and we naturally will inquire into the cause.

It is not likely that any one for the sake of experiment will make more than a very superficial investigation, whether wear-

ing cylindrical glasses will render astigmatic a non-astigmatic eye. However, spherical lenses, obliquely set, must be considered as equalling cylindrical lenses in their action. If, therefore, individuals wearing spectacles look obliquely through their spherical lenses, they do just what we would hardly do with cylindrical lenses for experiment's sake. That this is very frequently done, we may see daily. The patent spectacle-frames to which our attention was drawn at one time by Dr. Krueger (which had their independent predecessors in England, and perhaps also in other countries) were invented on the supposition, that looking obliquely through the glasses produces faulty images, and may even harm the eye. We, furthermore, see very often, that individuals, myopes especially, turn the head sidewise and purposely look obliquely through the edges of their glasses. It does not matter, whether this is merely a bad habit, or whether it is in order to make use of the stronger refraction of the edge of the lens in spite of the resulting distortion of the image, or whether finally in order to correct an already existing astigmatism,—we must suppose, that in this way in time astigmatism may and must be acquired, if it did not exist beforehand.

The *pince-nez* shape of glasses which of late has come too much in fashion is a similar instance. Observing the individuals wearing such glasses must make plain even to a non-professional eye, that these glasses sit often so obliquely on the nose, that we are forced to presume, that in this way the wearers must either see very indistinctly, or that there is some astigmatism already existing, and finally, if this latter is not the case, that after some time it may lead to the formation of astigmatism. It would in my opinion be worth while to see, whether the methods of wearing the glasses just mentioned, or similar ones, are not an etiological factor in the production of the lower degrees of astigmatism which are so frequent. I have not yet had a sufficient opportunity myself to collect enough of convincing observations.

I finally want to draw attention to one point which so far as I know, has not yet found the recognition it deserves, that is,

the direction in which the light strikes the spectacles when used for near vision.

When we use both eyes for work at 20 or 30 cm., the light coming from a point opposite the median line of the body falls obliquely upon the glasses which are parallel with the surface of the face. The angle between the rays and the glasses when the distance of the points of rotation is 55, 60 or 65 mm., is at a reading distance of 30 cm., equal to  $5^{\circ}$  or  $6^{\circ}$ , at a reading distance of 20 cm., equal to  $8^{\circ}$  or  $9^{\circ}$ . When the reading distance is still smaller this angle is increased in rapid progression, and is, for instance, at 15 cm., equal to  $10^{\circ}$  or  $12^{\circ}$ .

In order to get a more accurate view of this, I had a little mechanism constructed which enables me to determine pretty accurately the degree of indistinctness due to the obliqueness of the glasses.

The spectacle frame can be rotated around a vertical axis. The degree of the angle of rotation can be accurately determined. A lens is put into the frame. Then by means of a telescope standing behind it, and through the glass when in a normal position, a distant mark is observed (say fine vertical parallel lines) which lies exactly in the axis of the telescope. Then we see by what degree of rotation of the lens in the frame the image becomes blurred. A large series of experiments has shown, that with a glass of +3 D. an angle of  $5^{\circ}$  of rotation would produce a blurring.

From this we may assume that continued working with + glasses of 3 D. at from 25 to 20 cm., or still nearer, can produce astigmatism of the crystalline lens in consequence of the continued exertion to correct the blurring of the image due to the oblique incidence of the light by means of the accommodation.

This is a preliminary communication which I hope later on to be better able to prove. Meanwhile, perhaps, other colleagues will have occasion to make observations which may verify it, or do otherwise.

The consequence of this assumption with regard to prophylaxis would naturally be, that the glasses of spectacles for

near work must not lie in the same plane but stand at an angle with each other, corresponding to the distance of the object looked at; this angle must be the wider, the larger the distance of the points of rotation of the eyes, and the smaller the farther the object is removed.

For weak glasses, and when the object is not very near, the angle is, of course, very small; for very near work, however, my observations seem to be of great importance.

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In the *Centralblatt f. Augenheilkunde* Prof. Hirschberg relates the following interesting case:

There are astonishing cases which we are ready to believe only when we have seen them ourselves. To this category belongs the following case in which by an embolism of a retinal artery sight was very considerably reduced, but brought easily back to the normal standard by simple friction.

At about 7 o'clock in the evening of October 18, last, a very nervous gentleman, about 52 years of age, called on me who, while on Change that afternoon, had noticed a headache, dazzling before the right eye and obscuration of vision in it. Having reached his house, he saw a phosphene like fireworks which lasted for several minutes, the loss of vision has remained. Although he had so far never shown any heart symptoms, I had to assume an embolism of one of the arteries of the retina. It was, however, impossible to see it with the ophthalmoscope, the examination being a very difficult one, since the patient did not keep his eye steady for a minute.

I instilled homatropine and tested his vision. The left eye was normal. The right eye could not recognize Sn. cc at 15', and read with a+6 Sn. xxx at 6 inches. It showed a characteristic sector-shaped defect of the visual field which corresponded to almost the whole of the upper inner quadrant, its position tending towards the macula lutea. I then again examined it ophthalmoscopically. The lower outer branch of the central retinal artery (*art. temp. inf.*) was normal, even in color, for the distance of about four diametres of the papilla; then came a short piece of one-third the diameter of

the papilla in which the artery contained a brownish coagulum which appeared as a dark central line, while the parts nearest the walls of the vessel could be seen as fine white lines above and below. Then followed a little further on a perfectly dark-brown appearance of the artery and branches, which at different points became invisible so that it looked as if the artery was interrupted. I now saw also a very minute degree of oedema of the central parts of the retina, but the red point in the fovea centralis was not yet well defined. Pressure upon the eyeball elicited no special symptom on account of the restlessness of the patient. It appeared to me, that I could compress the upper branches of the artery, but not the lower ones.

I at once directed him to turn the eye toward the nose and rubbed hard upon the posterior temporal part of the eyeball, until after about a minute's time, tears, pain, and phosphenes forced me to stop. The patient soon acknowledged, that he saw better; but, not feeling safe, I did not test his vision more carefully then.

While he walked home his vision became normal. When he returned the next forenoon the visual acuity, visual field and ophthalmoscopic image of this eye were exactly the same as in the healthy fellow eye. Of course, I do not know, whether this case might have got well if left alone, but I considered it imperative to make an attempt to cure it.

## IN MEMORIAM.

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ELKANAH WILLIAMS, M. A., M. D.

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DIED OCT. 5, 1888, IN THE 66TH YEAR OF HIS AGE.

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"We live in deeds, not years; in thoughts, not breaths; in feelings, not in figures on a dial. He most lives who thinks most, feels the noblest, acts the best."

If it is the object of the physician's life to benefit his fellow creatures and add to their comfort and happiness, and relieve them of the ills that flesh is heir to, it must be a source of great satisfaction to a man who has reached the zenith of his ambition to look back on his life and feel that he has accomplished this. There are many men in our noble profession who have been able to do this, but none more conspicuously than Dr. E. Williams, of Cincinnati, who recently passed away.

He started on the career which gained him so much honor and such a world-wide reputation against the advice of some whose opinions he sought. They did not take the broad view of the work of the specialist that he did, for at that time specialists, except surgeons, were hardly known. His aim was high, and he determined to lay the foundations of his life's work broad and deep, and, therefore, went abroad to study with the best teachers in Europe. His early practice was in Bedford, Ind., his native town, but he determined to make the eye a specialty and devote his time to it exclusively. He went abroad in 1882 which, as it proved, was a most auspicious period. Up to that time the interior of the living eye was almost a term incognita, as the means of diagnosis of intra-ocular diseases were very imperfect. General deductions from



objective and subjective symptoms were all that the best physicians could give. At this time Helmholtz was experimenting on the use of the ophthalmoscope which he had invented, and Dr. Williams studied its use in Vienna with Arlt and Jaeger, in Berlin with Von Graefe, and in Paris with Demarres, and soon acquired a proficiency in its use. It seems strange that he should have had the honor of introducing the ophthalmoscope to his London colleagues, Bowmann, Critchett, Wordsworth and others, and give them their first lessons in its use, and yet it is true; and they were generous to concede him this honor, as many a student who made their acquaintance will know.

Dr. Williams had a talent for language and acquired both French and German during the period of over two years, which he spent on the Continent, so that he was able to converse or write with ease in either language. His familiarity with those two languages was of immense advantage to him subsequently in communicating with his clients, as well as in taking advantage of the literature printed in French and German, which is so valuable. While abroad he was a constant attendant at the clinics which afford such rich material for study and observation, and familiarized himself with the most approved methods of treatment, both surgical and medical.

On his return to Cincinnati he began his life's work with many conditions against him. The profession had not yet been educated up to the point of encouraging a specialist, but a few warm friends in the city stood by him and gave him opportunities for showing his superior skill. His personal appearance impressed his clients favorably. His genial and expressive face bespoke the soul within. His kind and sympathetic voice, his careful and exhaustive methods of examination, his sound advice based on extensive experience, all impressed those who applied to him for advice most favorably. There was a personal magnetism about him which very few men possess. He enjoyed a joke or humorous story, and many a patient who entered his office with a lugubrious face was soon laughing in spite of himself. It was not many years before he enjoyed all the substantial evidences of his popularity that any

man could desire. He was fond of medical students and gave them every opportunity to see cases in hospital and clinical practice which would be of advantage to them. As a lecturer, he was fluent, clear and forcible. He spoke with ease and interspersed his lectures now and then with a story or joke, which was always enjoyed. Dr. Williams has the credit of delivering the first regular didactic course of lectures on the eye in this country as professor of ophthalmology in the Miami Medical College. He served for many years as oculist on the staff of the Cincinnati Hospital, and his devotion to the poor won him many warm friends. He was honored by the profession both abroad and at home. He was an honorary member of the medical society of Athens, Greece, and of the Society of Ophthalmology of the United Kingdom. He was President of the state medical society of Ohio in 1875, and in 1876 was chairman of the section of ophthalmology of the International Medical Congress. He received the degree of M. A. from Asbury University, Ind. (now Depauw), and the degree of M. D. from the medical college of Louisville, Ky.

Dr. Williams possessed a strong religious nature, and his devotion to his profession was only equalled by his devotion to his church. He had advantages as a pioneer in the profession which no one else can ever have, and his name is now more generally known than that of any other specialist. Many a pleasant recollection lingers around his name at many a home and fireside where his skill has made life more tolerable by saving or restoring the most precious of senses—the sight.

## REVIEWS.

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A Manual of Ophthalmic Practice. By Charles Higgins, F. R. C. S. E. With illustrations. Philadelphia; P. Blakiston, Son & Co.; \$1.75.

This little manual, which is intended for students and general practitioners makes one more of the continually increasing number of short text-books on eye affections. It is as well adapted for the class of readers it is intended for, as most of them. It appears to us, however, to be somewhat behind the times, especially in the lack of application of modern pathology.

The Physicians' Visiting List for 1889. Philadelphia; P. Blakiston, Son & Co.

This well known and extremely handy visiting list does scarcely need any further recommendation. It is neat and well arranged and contains a great deal of valuable information.

Dioptric Formulæ for Combined Cylindrical Lenses, applicable for all angular deviations of their axes. With six original diagrams and one albertype plate. By Ch. F. Prentice. James Prentice & Son, opticians, New York.

Some time ago we had occasion to notice and highly recommend a treatise on simple and compound lenses by the same author. This second volume from his pen is of equal merit, and will well repay careful perusal.

The author, in his modesty, is afraid that his trying to instruct, he being an optician, may call forth unusual criticism. Surely he need not be afraid of such criticism. On the contrary, work like his is certain of being gratefully received, and he deserves every encouragement in his good work.

ALT.